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Memoir on the scientific cooperation between Japan and the People's Republic of China for research on Lepidoptera

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Summary

I attempt to identify the reason for the current frustrations felt by the Japanese lepidopterists about their isolation from the Chinese butterfly fauna. It may be due to the absence of an on-going systematic and comprehensive research program comprising many locally oriented concrete projects, which may be proposed for a better understanding of butterfly lives in China, within the existing framework promoting bilateral scientific research cooperation aiming at mutual benefits between the two countries. This does not necessarily mean discovery of new taxa in remote areas where several joint expeditions have so far gone, presumably owing to an awareness on the part of the People's Republic of China of the possible existence of unexplored resources. As an alternative approach, a deeper understanding of the butterfly lifecycle in various ecosystems, especially at the interface between deciduous broadleaf forests and laurel forests in the southern half of China may be thought to be of great significance with respect to the planning of nature conservation compatible with ecology-oriented human development of resources in these areas. A comparison between Japan and China with respect to human-nature interactions would be of particular interest and benefit to both Japan and China.

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Abbreviations

AJCSTE	Association for Japan-China Science and Technology Exchange
AS	Academia Sinica or the Chinese Academy of Science
BIZ	Beijing Institute of Zoology, Academia Sinica
BMNH	British Museum (Natural History), London
COAP	Council of the Old Age Problems
IFTA	Insect Farming and Trading Agency, Bulolo, Papua New Guinea
KAJCSE	Kyoto Association for Japan/China Scientific Exchange
KIZ	Kunming Institute of Zoology, Academia Sinica
KM	Museum Alexander König
LSJ	Lepidopterological Society of Japan
PRC	People's Republic of China

1. Introduction

During 15-24 May 1988 I visited the People's Republic of China (PRC) on an invitation from Academia Sinica (AS) arranged by the Association for Japan-China Science and Technology Exchange (AJCSTE, or Nittyuu Kagaku Gizyutu Kooryuu Kyookai) to meet scientists at the AS Beijing and Kunming Institutes of Zoology (BIZ and KIZ, respectively). This report is the outcome of that visit, including an analysis of the current situation and the results of deliberations on desirable directions for cooperation between the lepidopterists of the two countries in the future. My trip coincided with the widely publicized event (1) in which a butterfly dealer/collector from Japan, stationed in Osaka, was arrested with a fine and deportation in Yunnan Province while poaching (an offence against the provincial laws for protection of natural resources) for the purpose of smuggling out Chinese butterflies, including highly prized species, an operation that involved some local assistants. It also coincided with an uproar by both amateur and professional members of the

editorial committee of *Yadoriga*, the non-specialist magazine published by the Lepidopterological Society of Japan (LSJ), against a proposal of introducing a stringent editorial policy not to accept the parts of a submitted manuscript which described new taxa based on materials apparently exported from the PRC without approval of the authorities there. (The manuscript was unsuitable anyway to that magazine which is not intended for original papers, there being *Tyo to Ga* published by the same society for more formal scientific papers). The board of the LSJ has thus decided to urgently consider whether to announce an official view concerning the policy of the society which will decline to accept for publication manuscripts describing any new taxa based on specimens from China, the export of which has not been authorized by the relevant controlling body operating in PRC, which sets some clear-cut conditions and rules for research and publication on organisms collected in the PRC.

This series of events has prompted me to analyse the current situation about the collecting and export of Lepidoptera in China, as well as research, publishing, and cooperation among scientists from different countries on the subject, in order to determine desirable directions to be taken in the future by the communities of professional and amateur lepidopterists in Japan. This is being done in my own personal capacity, and does not necessarily represent or reflect the official view of LSJ. It is rather meant to serve as a basis for discussion and decisions through an exchange of opinions between the Japanese and Chinese scientists (in a broad sense). I will translate this document into Japanese and will send either or both versions to relevant authorities in the PRC and AJCSTE, and also circulate them among Japanese lepidopterists. Later I may or may not seek their publication, upon appropriate revisions, in *Yadoriga* (in Japanese) and/or *Tyo to Ga* (in English). In so doing, I feel that it would be essential to be frank about the realities in the two countries in order to overcome the obstacles, difficulties and perhaps also any animosities which might develop in certain quarters. In this sense, this document is not meant to be a final verdict but only intended to serve as a starter for further discussion, analysis, and deliberation, and I am willing to withdraw any of my arguments and judgements as premature, mistaken, or misguided if countered and refuted on reasonable evidence or challenged with attractive or persuasive alternatives as advanced by any parties involved.

2. Current void of background knowledge about Chinese Lepidoptera, butterflies in particular

In recent years, the means of international travel and other facilities have expanded the range of collecting trips undertaken by professional as well as amateur collectors of developed countries to various corners of the world. Keeping pace with this, a large number of extensive iconographs in colour of butterflies from various faunistic regions of the world as well as individual countries have been published. This trend now enables lepidopoterists to gain an integral view of butterflies of the world, and, in addition to a host of

classical works (e.g., 2-4), a riot of monographs and taxonomic revisions of various higher taxa has now been published (e.g., 5-13), or can be undertaken, on a world-wide basis. Thus, butterfly faunas of some remote countries such as Papua New Guinea/West Irian of Indonesia (14) and Afghanistan (15), as well as the entire Aethiopian and Neotropical Regions (16, 17), have come to be known fairly well, removing some lacunae in our contemporary knowledge about the butterflies of the world.

Into this picture now comes the present deficiency in the global whole of background knowledge (up to the currently accepted standard) about Chinese butterflies, considered as something regrettable, to be remedied as soon as possible, or even irritating to some. To give an example, I published, on the occasion of describing new taxa of Lycaenini (*sensu lato*) or copper butterflies (Lycaeninae) in Papua New Guinea, a tentative scheme of higher classification for Lycaenini of the world in 1974 (8). At that time I felt that more should be known about some taxa for completion of the study on this tribe. Since then a number of important contributions have been made to studies on some difficult or interesting groups of the tribe : from New Zealand, resurrection of a species hitherto unrecognized (18) and designation of a new genus (19) ; from North America, subdivision of the new-world genera (20) and life history (21) ; and from the USSR, extensive revisions of all the genera, with a few new species, endemic to Central Asia and Caucasus (22, 23).

Meanwhile, after publication of my own paper, I came to notice that a little known but very interesting taxon — *Lycaena irmae* (Bailey, 1932) — had been described from Tibet, a series of specimens being in the British Museum (Natural History), London (BMNH), and the American Museum of Natural History, New York. However, this taxon is not mentioned in the relevant section of the recently published extensive monograph on Tibetan insects (24), a memorable achievement of the Chinese entomologists under the aegis of AS.

In the course of that work on coppers of the world, I stumbled on a certain interesting problem about a correlation between butterfly patterning and lifestyle with its bearings on evolution (8). I have been waiting, albeit in vain, since 1974 for more knowledge on the biological aspects of five species belonging to one particular group of Lycaenini endemic to south-west China including Tibet (see Appendix). These events indicate that the void of knowledge, being gradually reduced for butterflies in many other parts of the world, still largely remains to be filled for Chinese butterflies.

The above story is relevant to the current status of our knowledge on butterflies in the world-wide perspective. I will now specifically consider the state in which Japanese lepidopterists find themselves with respect to their subject — above all, Japanese butterflies and their relationship to allied butterfly taxa from the Asian Continent, especially their ecological, biogeographic, and evolutionary aspects, as well as their significance in the conservation of natural environments and policy for national development. At certain major centres of butterfly collection abroad, there are some substantial materials of Chinese

butterflies, such as the Leech and Oberthür Collections in BMNH, or the Höne Collection in the Museum Alexander König, Bonn (KM). The difficulty involved in referring to the specimens contained in those overseas collections, which must be acutely felt by our Chinese colleagues, and which we know is quite real, is thus also shared by Japanese lepidopterists. Scientists in the PRC can, however, domestically find equivalent specimens, but for Japanese lepidopterists, the export regulations currently imposed on insects by the PRC, appears to be a formidable barrier, indeed almost unsurmountable for some. It might thus be understandable that many Japanese lepidopterists would feel that the current situation particularly and singularly disadvantages Japanese scientists. This is because even though lepidopterists in Japan, Europe, and North America are mainly working on Palaearctic or Holarctic species, the Chinese fauna would not be so directly involved in the work of the American or European lepidopterists, whereas this is not the case with the Japanese, who would then surely find themselves somehow handicapped. A comparable situation for British and U.S. workers would be one in which the import of specimens from the European continent and Mexico is strictly regulated by the governments of those regions. For example, suppose we find that a species, so far assumed to be widely distributed in the eastern part of the Palaearctic region including Japan, actually falls into two or more distinct species — as in the case of a nymphalid taxon *Fabriciana adippe* (Denis & Schiffermueller) and its allies (25). The absence or scarcity in Japan of relevant reference specimens from the continent would make it hard to solve the problem. It would follow that a taxon or taxa native to Japan could not be properly identified without collaboration with competent workers on the continent : a desirable situation but one which may of necessity consume an unreasonably long time.

In fact, such circumstances are felt especially painful and frustrating at a time when Japanese lepidopterists have already explored, fairly exhaustively, their domestic fauna for life histories and other ecological as well as taxonomic aspects, and now wish to solve remaining difficult problems concerning some Japanese taxa by comparison with materials from the Continent, and assisting, if necessary, our overseas colleagues in this respect by applying their expertise to these problems. These points can be verified by the fairly well understood status of butterflies in Taiwan (26), where Japanese workers have so far had relatively good access to the native fauna and have been allowed to freely contribute ; and also by the recent success in the elucidation of life histories of some of the rare, spectacular, and taxonomically crucial papilionid species occurring in Northern India, Bhutan and West Malaysia by Suguru Igarashi (27).

The frustration of the Japanese lepidopterists may thus be summarized like this ; they feel that they are competent enough and more knowledgeable about butterflies in East and South-East Asia at large than any other national groups of the world, and thus would be able to significantly contribute towards elucidating many aspects of Chinese butterflies. Paradoxically, however, they are excluded from contributing in this way by a situation which is the product

of ramified and often regrettable historical processes. This seems now to have led some of the Japanese to the (wrong — I believe, see below) ideas that their Chinese colleagues and the PRC government are virtually throwing away the opportunity to advance and extend our scientific knowledge, a conduct which must be regarded as reactionary and should be resisted by Japanese workers in whatever possible ways : and also that the policy taken by the PRC is based on socialist or totalitarian ideology and would not be valid or generally acceptable in more liberal countries such as Japan.

3. **Attitudes of Japanese lepidopterists**

The last two decades have witnessed that scientific research cannot claim primacy over other human activities, but should be regarded as only one of many, competing each other for their significance and contributions to human and global ecological welfare. There are areas and subjects in which scientific research must be restricted and/or regulated rather strictly, and many guidelines (28) have been issued, or even laws promulgated, to contain scientific research within reasonable limits to obviate conflicts between it and other human values. These areas now include genetic engineering, human embryology and reproductive science, experimentation on human subjects, and some biomedical and psychological experiments using higher primates.

Regulation of the collection and export of, and the research and publication on, organisms occurring in China as imposed by the PRC, when viewed in this context, looks quite reasonable. Moreover, the PRC is not alone in implementing a policy of this type. Australia has long promulgated a law disallowing export of their insects except under certain conditions, and Papua New Guinea and the Solomon Islands have largely declined issuing permits for collecting in their territories. In these latter cases, the reason for the reluctance to open their countries for overseas collectors seems to be twofold : the undesirable influences of modern personnel on the native community, unilaterally upsetting the economic, cultural and social balances by abruptly introducing a value system which may be valid only in industrially developed countries ; and protection of their natural resources which should be developed for economic activities of the native people as against the *commercial* exploitation by foreign agents. The reason why the Australians erected barriers for free export of their native insects is due to the inconvenience of most of the holotypes of their insect fauna being housed in remote overseas institutions not easily accessible for domestic workers. Some of the Australian entomologists responded with an outcry against the promulgation of such a law, but eventually the law went into effect and has since remained unrepealled, although some of the Australian entomologists are still cynical about it.

It would therefore be quite inappropriate that some Japanese lepidopterists tend to view the barrier erected by the PRC against free access to Chinese insects by overseas workers as a threat to the freedom of scientific research and the advancement of science. In particular, Japanese lepidopterists would

have us believe that, even though they are late-comers with respect to the collection of Chinese materials, the national standard of research on lepidoptera is now quite high in Japan, and indeed much higher than that in the PRC, so that the free access to Chinese materials for Japanese lepidopterists would in the long run contribute more to the sciences and the use of natural resources in the PRC. Such a way of thinking, however, is alarmingly similar to the ideology held in Japan during the twenties and thirties (and which certain quarters of the Japanese wish to resurrect without a body of historical evidence acceptable to the international learned community). Actually, that ideology allowed, on the one hand, the view that the late-coming Japan could help the then "backward" China through Japanese interferences on the Continent, first by a number of dubious self-appointed asiaist activists followed by outright military devastation, and on the other hand led to the failure by the Japanese to help Chinese revolutionaries such as Sun Wen and others who sought asylum in Japan. Moreover, the conditions of international cooperation for research on Chinese insects as spelt out by the authorities in the PRC (29) do not seem to be known, let alone well understood, among most lepidopterists in Japan, who have been baffled in the past by stringent conditions which have reduced the authorized import of Chinese lepidoptera into Japan down to a mere trickle.

As far as I understand from the written material (29) as well as from consultations with our colleagues in both BIZ and KIZ, the conditions imposed by the PRC for the export of insects are as follows : every application for the collection and export of Chinese insects by foreign bodies is judged by the Department of Insect Classification at BIZ on the criterion as to whether such activities are for the mutual benefit of the sciences in both China and the applicants' home countries. In order to satisfy this criterion, any project which involves collecting and research must initially be clearly defined, and an agreement is made that description of new taxa emerging from the project must be written under the joint authorship of both Chinese and overseas scientists. Also, the designated holotypes must be deposited in one of the museums in the PRC, but some paratypes may be retained by institutions abroad. If there are no competent scientists present in the PRC for particular taxonomic groups included in the proposed project, overseas scientists may initially take away the entire series of collected material for study, but for publication the name of a Chinese scientist should still formally be included in the joint authorship. Many laboratories in a number of institutions in the PRC are now open for overseas scientists to visit and stay for research work, and many more will become open in the near future. One of the limiting factors may be the shortage of supporting funds available within the PRC, because housing overseas scientists in any laboratory would require some costs affecting what would otherwise be available for other projects going on in the same laboratory.

Examples in Japan of the cooperative research on Chinese insects in the past and present, conforming to the above conditions, are as follows. Saigusa

& Li (30) on the rare and rediscovered papilionid *Bhutanitis mansfieldi* (Riley) with a description of a new subspecies ; Prof. Chikahiko Naito of Kobe University visited north-east Xizang (Tibet) as a member of an AS/Kobe University joint expedition and collected ca. 400 specimens of the Tenthredinidae (Hymenoptera), all of which he brought back to Japan, and recognized some 130 species that are still under study under his direction ; Dr Gentaro Imadate of Tokyo has been working on Chinese proturans at the Shanghai Institute of Entomology in collaboration with Prof. Wenying Yun ; at the University of Osaka Prefecture, Sakai, Prof. Toshiro Yasuda has been in contact with BIZ on a long-standing basis, exchanging information and insect specimens including microlepidoptera ; and quite recently, a joint exploration of the insect fauna in Yunnan Province has been launched under the general leadership of Prof. Toshitaka Hidaka, as a joint project with AS and the Kyoto Association for Japan/China Scientific Exchange (KAJCSE)/ Mountaineering Club of Kyoto University Graduates (Kyoodai Gakusi Sangaku Kai).

This last-mentioned venture is apparently a sequel or the result of some past mountaineering expeditions, which has apparently come to be appreciated as a form of scientific exploration in remote areas of China. A request allegedly came from the Council of Old Age Problems (COAP) of China, some members of which, as meritorious survivors of past revolutionary struggles, seem to be in charge of administering the outback of the PRC, the area which is a very likely and desirable target for scientific expeditions. This apparently seems to be a backdoor or detour, an alternative to the ordinary pathway of filing official applications for joint research projects between Japan and the PRC. I have been told, from both sides of the negotiations, that this application has been a tortuous and difficult process for both parties. For instance, KIZ observed that a direct initial contact with them made by KAJCSE would have made the negotiations much simpler and easier, because it was this institute which was in charge of making the final decision in this kind of matter.

On the side of the Japanese, however, this might not sound as straightforward as is said, because they are aware of the fact that in the past most of such applications have been turned down, and the KAJCSE's initial commitment to COAP might have helped secure the virtually unprecedented breakthrough in the negotiation. Nevertheless, it might simply be the merit of the project which won final approval from KIZ. In relation to the experience of this latest joint venture, many Japanese lepidopterists would feel, on the basis of their past experiences, that what they are told by the Chinese authorities was a willingness to cooperate in general principle, but when it comes to individual projects the responses have simply turned out, almost invariably, to be eventual rejections. However, our colleagues in BIZ might say that they were reluctantly forced to say "No" simply because the proposed project had hardly gone beyond a simple collecting plan without showing any obvious benefit for the PRC.

However, as explained in the preceding section, for Japanese lepidopterists, any concrete project aiming at a deeper understanding of the *known* fauna of butterflies in China (not necessarily aimed at discovery and description of new taxa, and hence not involving designation of types) should require, as the prerequisite, familiarity with, and hence, personal and intimate involvement in general collecting, identifying, and/or observation of, the local fauna (see Appendix). This should be so because research projects would need some good insights into reality, as helped very often by inspirations, which may very well be generated by frequent direct contacts with nature, then and there, involving representative specimens in reasonable quantities (revealing "variations") of the taxa occurring locally.

Another point of frustration felt by the Japanese workers on butterflies is the following: apparently nobody has ever had access to the *core* of the national collection of butterflies allegedly stored in BIZ. The responsible curator of this part of the PRC National Collection seems to have evaded the visitors from Japan having appointments by his simple being away from the institute on appointment days. Various stories based only on guesswork are aired in Japan about this fact, often becoming libellous to the responsible scientist involved. Unfortunately, my own experience does not help in this respect. Owing to some unexpected way of processing, on the side of AS, of their invitation to the PRC extended to me, I happened to arrive at BIZ and KIZ without having directly notified the people at these institutes of the purpose of my visit, and without knowing the dates of my visits until I actually arrived at the respective cities of Beijing and Kunming. I was surprised to find, upon my arrival, that they had not received any information from AS about the purpose of my visit either. To my disappointment, the curators responsible for the butterfly collections were away at both institutes on the days of my visit and I missed the chance to inspect the core of their collections and also the chance to have an in-depth discussion on the subject I describe in the Appendix with the competent specialist in BIZ. In comparison with the museums in Western Europe and the USA which I had visited, however, the butterfly collections of the Chinese institutes seem to be less accessible, even to official visitors. I am therefore not in a position to confirm or to refute some of the rumours going around in Japan that the policy of the PRC for stringent regulation of the export of Chinese butterflies cannot be trusted at face value, but is simply a window-dressing. I can, of course, counter such an argument using a number of positive incidences enumerated above. Future planning for cooperation between Japanese and Chinese workers on butterflies must take into account the circumstances just described, however.

Another relevant point here is that in Japan, research activities on butterflies have been made by very strong initiatives and venturing spirits on the part of amateurs. Their vigour seems to reflect the innovative drives of Japanese corporations and trade companies which have been often overactive abroad, especially in recent years, causing much consternation and antagonism overseas through their overt slant towards the head-on plunge into sheer economic

and cultural imperialism. There is hence no denying that the attitudes of some Japanese butterfly collectors, and also research workers, could have had that stigma of "economic animal", disregarding all other human values in the pursuit of their own set target. However, in entomology, especially with Lepidoptera and Coleoptera, professional specialists in any country cannot afford to completely disregard or antagonize the activities of amateurs because of the mutual benefits in conducting research on many fronts.

In this respect, the representative body of Japanese specialists on butterflies and moths should not automatically be sought among official authorities in the public institutions like university departments and museums, but probably among specialists' associations as exemplified by the LSJ, which however now finds itself in a quandary. This is because overt expressions by some LSJ members of their feelings against the uncooperative stances they think they have perceived among the authorities of PRC, which they think is tantamount to suppressing the progress of science, are now undermining the standing of the LSJ executives who hope to maintain good relationships with all the related bodies overseas for the obvious mutual benefits to be cultivated over a long period of time to come.

4. The current policy of the People's Republic of China for collection of butterflies in China

Written material (29) as well as first hand experience during my visit to the PRC indicates that in the PRC the fauna and flora are regarded as national (and provincial) resources, and that it was mainly the biologists in the PRC who condemned the initial inclination of the government to use rare biological resources for economic gain through export. They apparently did so primarily lest no more specimens of would-be new taxa, including prospective holotypes, should all end up overseas, which would inconvenience and affect classification and identification of economically relevant organisms in China. However, this process may have accentuated their consciousness of the importance of the extremely rich biological resources in China. In conformity to the latest global trend of pursuing rapid economic return from investment for research, the PRC also making various ingeneous uses of the biological resources occurring in China, and more are under intensive investigation and development. This is especially conspicuous with the traditional herb-medicinal materials, but it is also true with animals. In this sense, the butterfly fauna in China may be regarded and protected primarily as resources or possible subjects of economic exploration in the future.

Apparently, the ideas of nature conservation and the management of development compatible with "ecology" have extended the consciousness of the people in the PRC relatively recently, only during the eighties say, despite the euphemistic stories we used to hear of the PRC having allegedly not been spoilt by the capitalist sin of nature exploitation for a short-term profit.

But that was before the advent of the current relaxation of the socialist policies for the benefit of competition-oriented liberal economic activities.

The current Chinese scene is in a way reminiscent of the one I saw around 1980 in Australia, where, as pointed out above, the export (but not general collecting) of domestic insect specimens came to be strictly regulated by the then newly promulgated law. The Australian solution to the problem of "holotype drain" took the form, initially at least, of "holotype declaration" by recipients of exported specimens, usually public bodies, which some museums overseas, such as the BMNH, refused to make, however. In any event, that was meant to be the necessary condition for the granting of a permit of export. The holotype declaration is designed to warrant a return of any holotypes which will be designated by scientists in institutions overseas receiving the exported specimens. However, the Australians were already conscious of their duty to the rest of the world as the "immigrant custodians" of the country's unique fauna and flora, and conservation of nature was on the agenda from the very outset. The Australian biological resources are thus conceived as part of the world heritage, and along with their conservation, the necessity of access to them for appreciation and inspiration, spiritual or scientific, by the world populace at large was in the mind of the Australians, who had undergone a painful soul-searching to make compatible, with any good modern standards, both the domestic and international research activities on Australian insects.

A comparison with the situation in Australia shows that apparently missing in China is an acute consciousness that its insect fauna is also an important part of the world's common heritage as well, especially in its south-west. Histories of the establishment of this fauna would by far surpass the length of the occupancy by the Han people of the area in which the fauna exists. However, their history in its turn has been as long as that of any human society, and their settlement in mainland China has never been interrupted, even though the course of Chinese history has not been uneventful as to the rise and fall of various dynasties belonging to different ethnic groups. Moreover, we are aware that in the recent past, the Chinese people have been brutally alienated from their resources under an imperialist devastation of which Japan regrettably played the worst part. It is therefore quite understandable that in the consciousness of the Chinese people, biological resources in China would unquestionably fall in their proud and just hands quite naturally. However, foreigners might imagine that they were having a touch of traditional sinocentrism in this form of thinking. In any event, the flora and fauna of China are inseparable from the rest of the world, and the world scientific community should respect the fact that they are under the trusteeship of the Chinese scientists. What is missing here is, therefore, certain positive statements coming out of the PRC as to their provisional plan for the course of feasible investigations to be made internationally on their unique biological existences. In its absence, any positive proposals on the subject to be submitted by outsiders may occupy the mind of the

international body of specialists, superseding or even making obsolete, by dint of the inherent attractiveness of the subject, the national claim to it by the PRC scientists and the government alike. The only plausible plans which have so far been visible were joint expeditions to remote areas in China, which may collect information on the occurrence of so far unexplored national resources and hence welcome to the nation-state.

A further comment on the policy for national dependence on natural resources may be pertinent. Brazil, Mexico, Argentina, and more recently, Australia have shown the danger of depending too heavily on their very rich natural resources for international economic gain, because these countries are now grappling with stimulating their economies in the absence of powerful secondary or tertiary industries. Dependence on primary industries, however rich the extant resources may be, has finally proved to be quite precarious. Meanwhile, the continuous Japanese success in the world economy during the past several decades has been noted in good contrast to (or exactly in association with) the almost total absence of natural resources (except water and diligent people which at least the southern half of the PRC shares with Japan — Guangzhou's economic success may be quite relevant here !). Likewise, the recent economic rise of what are generally called NIES (Newly Industrialized East-Asian States) — those smallish nations and communities like South Korea, Taiwan, Hongkong and Singapore — are all virtually without resources, so that economic prowess without resources now seems to be the rule rather than the exception.

Of course, at the beginning of its modernization, Japan had to rely heavily on practically sole natural resources — silk, which is of course completely obsolete now. It is also a lamentable fact that the atrocious Japanese invasion into China or the Asian Continent at large was motivated by the fear of its non-possession of natural resources that appeared to be essential to the survival of a nation, a myth which has since been spectacularly broken by a few Asian nations including Japan itself.

Of course, the situation surrounding the PRC may have factors of a different nature. It is saddled with a huge population, enormous space to defend, and the existence of quite a number of ethnic minorities. It has brilliantly succeeded in feeding its immense number of people rather well — meat now seems to be part of their staple food (allegedly at the expense of some endangered species ? — see ref. 46). Their economy is now conspicuously rising, its annual GNP increment being close to those of the highly successful NIES countries, probably thanks to the recent change in the policy of the PRC government even if with a price to pay. The rise of a middle class, if I am allowed to use such a capitalist expression, may be almost imminent in the PRC. Soon, I expect, there will be a cohort of competent amateur lepidopterists in the PRC, who will, if guided properly, contribute enormously towards entomology in China. I understand that there is already a private association of some 200 lepidopterists in China, based in Shanghai. Also there seems to be a privately owned butterfly museum in the same city (31). It is probably time

to define, and to design a future path for, the desirable relationship between amateurs and specialists in lepidoptera studies within the PRC, as well as that between amateurs in the PRC and abroad.

Even though it could not be admitted officially in the PRC as once was true of its relation to Taiwan, indeed there has been an extensive poaching and smuggling of butterflies in China since around 1980, undertaken not only out of commercial drive, but perhaps primarily from the love of or longing for the butterfly fauna in China. This is not limited to Japan but shared by some of the European countries, which all belong to the same Palaearctic Region faunistically. In the absence of a major drive towards understanding or further research on the Chinese butterfly fauna coming out of the PRC (which is understandable given the political and economic troubles PRC was in), the existing void has been partly filled by the scientific fruits of such illegal conduct. Like some Russian artists and scientists in exile who have been accepted without question in Western countries, not only smuggled specimens but also relatively large bodies of novel scientific data recently obtained privately about Chinese butterflies have now started infiltrating lepidopterist communities outside China and being publicized only partially (32, 33), in Japan at least, and it is now becoming impossible to talk about aspects of Palaearctic butterflies without these data (47). Are we to regard them as a necessary evil produced by the course of historical contingencies, just like our current appreciation and utilization of the scientific and technological achievements for which war-time research work conducted with the objective of destroying the people of other nations was largely responsible ? With good and adequate planning to-day, the seeds of future evils may be eliminated — possibly. But what to do now with the products of past evil ? Should Australians all exit their island continent in the south leaving the country to the Aboriginals' autonomy ? Or should even the latter, who are now known to have driven a majority of marsupial fauna there to extinction, also desert the country for its original non-human occupation ? Should Euramericans evacuate the new world leaving behind Amerindians alone ? Is what we are trying to do now not to remedy as much as possible the damages perpetrated by the past mistakes of our ancestors, and to work, as equitably as possible, for the welfare of the surviving people, an enormous struggle as it may be ?

Before concluding this section, I would like to point out that local natural resources have multiple potential uses, with possible conflicts between different modes of their utilization. In particular, the contradiction between development and conservation should be carefully assessed for their short- and long-term effects. In this sense, butterfly resources, to be considered further below (section 6, p. 72) as useful indicators of local ecosystems, may always be in danger of eradication through various types of local development for a quick economic return. Therefore, we need to be constantly vigilant of butterfly resource, as convenient warning indicators of environmental deterioration. We need to monitor the soundness of butterfly resources by a cohort of competent collectors, who would quickly sense the vulnerability of the ecosystem under

current courses of development. A group of Japanese observers (32), using year-to-year variation of the local butterfly population at a locality in the PRC, has recently been led to infer extinction of a rare local butterfly, *Bhutanitis mansfieldi mansfieldi* (RILEY), and has correlated it with an almost total destruction of primary forests in the relevant habitat within the autonomous region of a minority at South Lijiang, North Yunnan. In this sense, it would not be simply declaring the possession of a local biological resource and prohibiting its collection, but rather the effective monitoring through continued collections (allowing an exact identification) which will give the best information about the status of that resource. In the case of biological resources, one has to take into account their dynamic nature, and should not easily apply the criteria effective for non-animate resources which do not proliferate.

5. Policy for publication in Japan on Chinese materials

The poaching and smuggling of Chinese lepidoptera are by no means a monopoly of the Japanese, but the attitude of the Japanese lepidopterists seems to be more aggressive than the other nationals. Usually secret collectors overseas seem to be content with having had first-hand experience with (particularly live) insects in China, getting familiar with the biotopes in which individual species thrive. However, they seem to be aware of the danger incurred by publishing papers based on the material with dates which would immediately expose the fact that the specimens used must have been collected without authorization. This will smear the good name of the writer, from which one would usually shy away. However, there have been open publications, in Japan, of some new taxa described from obviously smuggled material which may or may not be associated with commercial activities (33). The holotypes of the taxa thus designated have not been deposited in any public institutions, let alone Chinese ones, which is in the first place not in accord with the recommendation of the International Code of Zoological Nomenclature, not to speak of the policy of the PRC. Such privatization of holotypes may sound like a horror story in the English-speaking countries, where national collections are well centralized in a few authoritative museums. However, in Japan as well as in West Germany, there are many smallish local museums and apparently no single centralized authority has a national collection for reference, which may seem to give individual workers second thoughts about depositing holotypes in public institutions. In fact, the strong activities of non-governmental institutions in Japan are now well known as some of the main contributors to Japan's recent economic success.

In this connection, the achievements of Prof. Siuiti MURAYAMA of Aichi Gakuin University near Nagoya would deserve a special mention. He has been long committed to Palaearctic butterflies and has had good personal contacts with lepidopterists in China even since the time preceding the liberation in 1949, and has from time to time contributed towards knowledge

of Chinese butterflies, so much so that in recent years his help and advice are being sought by a few Chinese lepidopterists working in several local institutions. In recent years he has contributed, however, a few papers containing quite a few new taxa from various localities in China, based on specimens of unknown status (with respect to export) collected during 1980 and 1982, to a taxonomic journal published in the PRC (34). Moreover, he published these papers alone, i.e. not jointly with colleagues in the PRC, and all the type specimens including all the holotypes are apparently kept in his possession. i.e. not deposited in a public museum in the PRC. It is all the more surprising that these papers by MURAYAMA were accepted and printed in an academic journal published in the PRC. Hence it might be argued that, despite the policy insisted on throughout our formal negotiations, the rule has not been stringently implemented in practice even in the PRC. The arbitrariness involved may very well be used for justifying publication on unauthorized material elsewhere, and would threaten to nullify the signicance of my effort in writing this memoir, trying to work out a desirable course for LSJ to publish articles on Chinese materials. Moreover, as MURAYAMA himself told me, his papers have often become subject to intensive criticism in Japan. Although it is true that MURAYAMA is one of the most knowledgeable lepidopterists of Chinese and Palaearctic butterflies in Japan, uncritical acceptance of MURAYAMA alone by lepidopterists in the PRC may pave the way for academic criticism directed at taxonomic works done in the PRC by Japanese colleagues. It would be a pity for science if the current situation in the PRC would lead to more alienation toward the best Japanese lepidopterists.

In any event, the aggressive attitudes by some would encourage others to behave likewise, because obviously there is motivation for competition in Japan. If left uncontained and unreserved, this trend would infect many other workers, and the entire nation may eventually be regarded as perpetrators of illegal activities (in the PRC) because they failed to respect the policy of a friendly nation.

The most straightforward policy to be taken under these circumstances by a responsible association of lepidopterists in Japan such as LSJ would be to refrain from publishing any accounts containing references to Chinese materials with no evidence for their authorized export from China. However, such an attitude will reduce the popularity of the association and its publications among Japanese lepidopterists, thus undermining the association's sound economic basis, and consequently leading to a decline of orthodox scientific activities. It would be easier for a purely professional association of entomologists to implement a stringent editing policy in this respect. The Entomological Society of Japan defined, in 1982, their policy about new taxa described on the basis of specimens from the PRC etc. thus : the authors describing new species-group taxa should settle the question of depositing the type specimens with responsible people of the country from which the specimens originate.

A compromise may be effected by a policy according to which, upon receiving manuscripts containing descriptions of new taxa based upon unauthorized Chinese materials, a consultation is held with the authority at BIZ as to whether the manuscript may be published if the author(s) could be persuaded to revise it in such a way that as to meet the set criterion for bilateral collaboration in entomology : inclusion of at least one Chinese author and desposition of the holotypes and appropriate numbers (usually around 50%) of the paratypes in museums in the PRC. In fact, such a rule of handling has already had a precedent (30) for a series of specimens the collection of which actually violated either the provincial laws or the authorized principle of collecting by foreigners (29). It would indeed be a pity to suppress any publication resulting from it if a rare or unusual material stemming from smuggled material turned up in the laboratories of some researchers, and proved to be of obviously high scientific value. This is because, even if rejected here, the paper would only find its way to publication somewhere else, a matter for which no overt social punishment would be made. It would thus serve well the purpose of the Chinese scientific community to have half of the material including the holotypes returned to China. However, it would certainly be a dilemma for the authority in the PRC to go happily all the way with this policy, because that is tantamount to a *de facto* authorization of smuggling, certainly a contradiction of the good intention of erecting the export barrier. Judgement might therefore be made only on case-by-case basis.

Suppose that the PRC authorities are agreeable to this policy in principle, even if they handle the case negatively for the most part. There might then sometimes be articles on the material from China but originating from a time when the official export barrier had not been erected yet. I means that one might work on material out of the HÖNE collection say, and name new taxa, of which a classical example is not unknown (35). Certainly such a paper can be published freely without violating the rules set by the PRC. However, it would always be a gesture of goodwill to notify the Chinese of the existence of such a manuscript, generating a chance that the PRC could receive some of the types returned. What would happen if the new taxa were based on a single holotype ? The argument may then be raised that it would be premature to describe a new taxon ; and that it would not conform to the good usage of publishing a new taxon based on a single holotype, although this has been done often by some Chinese authors (36). The procedure may encourage a joint effort to secure more material by international cooperation.

In this connection I should like to point out that a rumour is going around in Japan that in the PRC taxonomists are encouraged to name new taxa because they would be rewarded on a per-taxon basis. This point needs to be clarified in order for us to launch any collaborative work, because we have to understand how things are done so that we can adjust our attitude, within a certain limit of course, towards naming new taxa in collaboration with out Chinese colleagues, simply in consideration of making academic life easier for them whether or not we would approve that type of policy for the long-term soundness of taxonomy.

To summarize, then, there would be three alternatives for us to recommend as an official policy for a publishing body in Japan.

1) To decline publishing any accounts dealing with the designation of new taxa on the basis of material exported from China without authorization.

2) To negotiate with authorities in the PRC whether or not they would agree to such publications as given in 1), provided the author(s) could be persuaded to meet the currently set conditions regarding the authorship and the deposition of type materials.

3) To follow the same format as in 2) for all the accounts involving materials originating from China regardless of the time of their collection and export, but to leave the matter to the discretion of the author(s) if they are not immediately agreeable to such a procedure. The author's decision would include their insistence on the submission of the paper, the acceptance of which should then be judged only on its scientific merit.

6. Butterfly studies as the basis of understanding interactions between human society and nature, and of conservation of nature

Consciousness of the necessity of nature conservation in industralized countries has often resulted in banning butterfly collections, but it is already apparent that such actions are in most cases making collecting activity a scapegoat (37), in order to divert the attention of the people from the real cause of environmental disruption due to development with little concern for nature conservation. Rather, butterfly collecting with restraints and careful scientific observations by a body of keen amateurs has proved to function as a sensitive detector of the first sign of environmental deterioration. This is because butterfly fauna may serve as an indicator of ecosystem integrity for about 80% of the latter's diverse members (38).

Owing to its species diversity and beauty, the whole butterfly group (Papilionoidea and Hesperioidea) may readily become the subject of attention even for those who have not had professional training in biology. Exactly this property of butterflies renders them capable of mediating our cognition of various terrestrial ecosystems even including littoral ones. The reproductive mechanisms of most insects, including butterflies, are radically different from those of higher animals. Only a very small fraction of the offspring can usually survive until reproductively mature adulthood, so that collecting with restraint or the breeding or rearing of butterflies does not significantly affect their natural population. It is usually the destruction or modification of habitats which leads to eradication of individual, sometimes even unique, colonies of butterfly species.

Interest in butterflies taken by a small fraction of the population will help clarify diverse aspects of their lives including the mostly herbivorous, but sometimes also the carnivorous early stages. Information about the way each butterfly species depends on local flora (and also some part of the fauna)

may be used effectively to deduce the cause of a decline of butterfly fauna in a given area, which in turn is an adequate indicator of environmental deterioration of one sort or another.

Moreover, Hiroshi MORIYAMA (39) has succeeded in his recent work in delving deeper into the reality of human-nature interaction, using, as a tool, aspects of butterfly distribution, reproduction, and local extinction. MORIYAMA argues as follows : It is generally believed that the south-west half of the prehistoric Japan was once (around 2000 BC) covered by laurel forests comprising laurels, camelias, evergreen *Quercus* species, etc. This was because the laurel forest was able to gradually advance to the north-east following the end of the last ice age about 12,000 years ago and after the general warming up of the Japanese Archipelago 7,000 years ago. However, the laurel forest was almost totally destroyed, in the plains in particular, on its way to the north-east by the prehistoric/historic agri-/silvicultural practices in the Japanese islands, except for their southernmost aspects, over a period of several millennia, with its tiny remnants surviving like sacred symbols within the enclosures of old shrines and temples. The inhabitants of the islands opened up the forest cover by field burning, and the area thus opened allowed the regeneration of the deciduous broadleaf forests then on their retreat to the north-east, either by artificial planting or as a part of natural succession. Such deciduous forests in the laurel forest zone contributed, according to MORIYAMA (39), to the recycling of natural resources by the inhabitants, and hence would have been actively maintained by them. At the same time, the initial patches of the deciduous forests provided a variety of ecological habitats comprising such man-made deciduous forests at the interface between human habitation and nature as well as between laurel forests and deciduous forests. MORIYAMA estimates the rate of dispersal of individual plant species by taking into account the behaviours of various animals that helped to disperse the seeds of the plants, a calculation which altogether indicates that with some plants the dispersal must have been extremely slow. MORIYAMA thus concludes that the contemporary flora of the deciduous forest zones, with their characteristic butterfly faunas, could not have emigrated all the way from the north-east long after the preliminary establishment of a homogenous laurel forest, at the time when this came to be extensively opened later by intensive human activities and gave away to the invasion, if temporary, of quickly growing deciduous forests. Rather, he suggests that such deciduous flora and its accompanying fauna, would represent the local ecosystem which managed to survive, thanks to the human interventions, there at the time when it was being encroached upon for the first time by the advancing laurel forest.

Now MORIYAMA notes, along with others, that natural environments of south-western Japan are now once again changing into laurel forest, which in fact represents the natural (or climax) vegetation conforming to the climatic conditions of the area. This change is prompted, as is widely acknowledged, by the recent change in the mode of agricultural production. The advent of modern, mechanized, energy-intensive (petroleum/electricity) agriculture has

changed the pattern of rural life in Japan : many processes involved in the traditional agriculture both on rice fields and around nearby copswoods, yielding harvests which mediated the quite effective recycling of elements through soil and water circulation, are now being abandoned and replaced by the technological products such as pesticides, herbicides, fertilizers, plastic hothouse and indoor cultivation, etc. MORIYAMA identifies several species of butterflies as indicators of such a traditional ecosystem undergoing human interferences, although the ecosystems comprising deciduous forests have hitherto been generally regarded as wilderness. In reality, such interferences are integral parts of the local culture of human society.

Nowadays, both butterfly species and traditional human culture are vanishing hand in hand with the local mixed vegetation of copswoods. MORIYAMA mentions that larvae of some species of thecline genera (Lycaenidae) of butterflies feed on the young growth of *Quercus*-species, which used to be planted in rural areas or constantly rejuvenated through rotational felling of the copswood for charcoal production, but that they have now long vanished from overgrown "conserved" areas, where once they were well established. Apparently a similar situation has also occurred at one of the reserves in southern England (37). For another example, *Luehdorfia japonica* LEECH (a popular papilionid species endemic to Japan) depends on blooming plants in deciduous forests required for feeding of the adults in the early spring and on plants (*Aristolochia* species), confined in laurel forests, which are essential for larval food ; therefore *L. japonica* can thrive only along the interface of the two kinds of forest, once quite prolific in Japan, and hence intimately bound to traditional human settlements in south-western Japan.

Thus, MORIYAMA's work has posed the question as to the real meaning of nature conservation. In such areas as Japan (and also China) where human communities have flourished long without major disruption or catastrophe, the concept of nature should mean ecosystems integrating human activities, and any policy for nature conservation must take this point well into account.

This conclusion reached by MORIYAMA with respect to the Japanese scene finds its parallels in other parts of the world, indicating its rather universal validity. I wish to mention two examples : First, in England, the endangered butterfly species *Maculinea arion* (LINNAEUS) (Lycaenidae) became finally extinct only very recently, because, in an attempt to keep their remaining unique habitat as undisturbed as possible, conservationists removed the local herds of sheep which had been there all the time. The sheep, however, were apparently an indispensable part of the local ecosystem supporting the life of this butterfly, the grazing sheep (or numerous rabbits) keeping the sward of turf very short, a condition that was needed for a particular kind of ant which was an essential factor of this myrmecophilous butterfly's complicated lifecycle (37). Some other endangered butterflies species are known to require similar short turf (37). Secondly, in the highlands of Papua New Guinea, around 2500-3000 m, I found some new taxa (8) of Lycaeninae (*Melanolycaena* spp.), which were quite remarkable for their occurrence in that country in

relation to the global distribution of their allies. In all likelihood they fed on a polygonacean creeper that grew well in the areas where forests had once been burnt by local people for highland agriculture of sweet potatoes, but which had turned into secondary forests after being abandoned for a long-term recycling land use. These incidences also suggest that stopping of traditional human activities would simplify the natural habitat and would lead to eradication of some of the local ecosystems.

7. **Suggestions concerning projects for future cooperation in scientific research**

As explained above, butterflies now occupy an exceptional position among insects for the following reasons. Their group is fairly large, nearly 1,200 or eventually more species may occur in China alone (40). This warrants that they are diversified enough to occupy very divergent niches, so that they could be used as markers of general terrestrial ecosystems. Moreover, butterflies are conspicuous and often very beautiful creatures, and most of the existing taxa are already named and classified to a reasonable degree. They thus may easily serve as the subject of amateur interests. For insects in general, the main task of entomologists in the PRC would be to catalogue the vast number of taxa native to China, though with butterflies that stage must now be over. It is time to go deeper into their biology ; in the PRC as well as in any other countries of the world.

Given this fact, it would now be imperative to devise a large number of attractive research projects to be jointly undertaken by lepidopterists of the two countries in order to effectively suppress, supersede, or at least compete with the lure of new scientific information based upon unauthorized material from China, and instead to obtain the consent of competent lepidopterists in Japan for fruitful research cooperation on the butterflies of China with research workers of the PRC, including amateurs. Here I wish to suggest a few candidates for such projects.

A. *Sale of a set of Chinese butterfly specimens to a museum in Japan*

As a drain of holotypes to foreign countries from China makes identification of Chinese insects difficult for entomologists in the PRC, the absence from Japan of systematic representative collections of Chinese butterflies makes it likewise difficult for Japanese lepidopterists to gain deeper insights into taxonomy and hence higher degrees of sophistication in identifying Japanese butterflies. In order to remedy this fact, a reasonably good set of representative specimens of Chinese butterflies (5 specimens of each taxa say) may be sold to a responsible Japanese museum, which should be willing to sign a contract guaranteeing a permanent curatorship of this collection and the eventual return of holotypes as well as the coauthorship with Chinese scientists for publications materializing therefrom.

Relatively small as it may be, this will represent an economic gain for research work in the PRC.

B. *The possibility of commercial butterfly farms in China*

Since demands of Chinese butterflies exist in the world market of Lepidoptera specimens for aesthetic as well as reference materials, some forms of butterfly industry may be set up in the PRC. In some habitats, the intensive collection of adult butterfly specimens would not endanger the local population, as has amply been demonstrated in Taiwan. However, for some species, it would be wise to breed or rear butterflies from eggs to be obtained from natural or artificial pairings. Such activities have been envisaged in Papua New Guinea, not only for the endangered birdwing butterfly, *Ornithoptera alexandrae* Rothschild (only after firmly establishing the protective measures for its survival in the field), but also for other commoner species with which the method has proven to be practicable (41). For the latter taxa, in addition to many others, the Insect Farming and Trading Agency (IFTA, see ref. 42), has been established for some time in Bulolo by the government of Papua New Guinea. Rearing butterflies *ex ova* will save a large number of individuals which would otherwise perish without surviving to adulthood, and which eventually would be employed as mounted specimens. It does make compatible both the provision of specimens for commercial purposes and the protection of the natural population, and would thus help local economy based on the native resource at hand. With some extra paperwork, setting aside a few reference specimens for adults emerging from each clutch, and labels inviting the return of the specimens or enquiries about more reference specimens in the event that new taxa are named using the specimens thus labelled — probably with some reward and a proposal of a joint authorship — the possible holotype drain (if any) through this channel would be considerably reduced. Japanese lepidopterists would be able to assist the Chinese personnel with a business with highly sophisticated techniques of breeding and preparing immaculate specimens of high commercial value. Both sales of specimens of good value and dealing in commoner specimens *en masse* for ornamental purposes may be considered.

C. *Publication of illustrated books in colour*

Given the current relative scarcity of information about Chinese butterflies, publication of a book or books on Chinese butterflies would serve as a stimulant to the populace which will support some good numbers of amateur lepidopterists. Such books should simply be regarded as a stimulant for, or a starter of, intensive research works rather than as the culmination of a long, dedicated scholarly or academic life. Hence duplication of books written by different authors on the same subject need not be avoided.

It is a common experience for many countries that a relatively inexpensive, colour book on the national butterflies would boost sudden enthusiasm among large number of amateur collectors and would interest some more dedicated entomologists, whose activities would then produce, for the first time, a solid body of really useful and important information about the subject. Such books are badly needed for Chinese butterflies.

a. On Chinese butterflies

This may be planned at various levels of academic sophistication, but should mainly be planned and written by our Chinese colleagues, with the role of Japanese workers perhaps being consultation and providing the skill for colour reproduction with relatively low costs. Some of the editions should be of small size with reduced-size illustrations in colour but without necessarily reducing the quality of the text. Such books with lower prices would be needed to ensure good circulation among amateurs in the PRC. The field-guide for the Japanese butterflies by HIDAKA *et al.* (43) might offer a good model.

b. On the butterflies of the East Asian Continent and some ancillary islands

Except for the Japanese islands and Taiwan, the butterflies of which have already been the subject of a number of excellent books, a rather ambitious, extensive book on East Asian butterflies is badly needed. This will include the Soviet Far East and Korean Peninsula as well as China, probably omitting Central Asian Elements. Such a book should be published with texts in several languages, and would enable lepidopterists of different countries to view their domestic faunas against a general background. Materials for illustration may be sought among collections from all corners of the world, including the good collections housed in the BMNH and KM and numerous private collections in Japan and Europe.

Incidentally, I recently took part in a bilateral consultation with the Russian scientists working at the institutions of the Far East Branch of the USSR Academy of Sciences, on the possible means of collaboration in biological research on the resources in the Far East. This was quite successful, primarily in the sense that both sides found very coingenial partners sharing the same enthusiasm about their subjects. We witnessed, with fascination, that the Russians first presented a very relevant, attractive, and comprehensive research program on the evolution of the biosphere in the Far East, and that they are now consciously very flexible in implementing the collaborative research programs. I was also pleased to find that they all highly appreciated the earlier text of this memoir and give their approval of the framework in which I tried to put the research programs with the PRC. It was also envisaged then that we would eventually expand the scope of this collaborative research to embrace Chinese and Korean scientists and their biological resources.

The book will need a tremendous amount of work, but we shall have to be satisfied with a rather modest achievement at the beginning, mainly trying to induce an improvement and completion of the work in the future. Input from our Chinese colleagues would of course be welcome and would surely be very helpful.

D. *Elucidation of life histories of practically all the species of butterflies occurring in China*

This might sound as too gradiloquent a project. However, we should recall the fact that Dr Susumu IGARASHI, who has been concentrating, out of his

personal funds, on rearing *Teinopalpus imperialis* and other extraordinary papilionids in Asia, has been able to clarify, as a by-product of his long search over 25 years, life histories (hitherto unknown), of 300 Southeast Asian butterfly species in addition to his success in the target group of the Papilionidae (27). If a large number of enthusiastic and competent Japanese lepidopterists were allowed to work in China in collaboration with some newly rising entomologists in the PRC, the project might help spread sophisticated techniques for life history studies possessed by the Japanese lepidopterists, which would exert two obvious beneficial effects on the PRC. The project would contribute towards educating and training a large number of potentially competent young people for looking into the ecological aspects of insects, and it would also elucidate various ecological problems associated with the ecosystems endemic to China. This project must be based on the progress of projects A-C, and obviously serve as the basic studies for project E. Fortunately, the first step along this line has been made recently as a part of the research cooperation between Japan and PRC, a very welcome event indeed.

There is already some body of information in Japan on the life histories of Chinese butterflies (32) indicating that efforts have recently been made, with some success, in elucidating many so far unknown life histories of butterflies in the PRC.

During the course of the project, some video recordings would be made by the mass media from either country, and these would be used for educational and entertainment programs to be released all over the world. Publication of several volumes in colour of the early stages of Chinese butterflies should follow.

E. *Studies on human-nature interactions at the interface between the deciduous and laurel forsts in the southern half of China, using life-cycles of butterflies as effective indicators*

This is the logical extension of the studies made by Moriyama (39) for Japanese ecosystems and butterfly faunas, which I described above (pp. 73-74). In Japan, the origin of the Japanese fauna and flora as well as agriculture and social institutions (i.e., general human cultures) are usually assumed to be intimately associated with the laurel forest zone, and these institutions may have originated in south-west China (Yunnan, in particular) (44). Originally, it was believed that the human culture further south in the tropical forests had given rise to the cultures in the laurel forest zone, which extends from north-east India eastwards across the Southern part of the Asian Continent, including the southern half of China, then extending to Taiwan, the western half of Japan and the southern tip of the Korean peninsula (44). The general theory then changed to assume (45), rather that the culture of the laurel forest zone was of primary importance, giving rise southwards to the cultures in the tropics and interacting with the latter. Now Moriyama (39) has drawn

our attention to the interface between the laurel forest and its neighbouring zones to the north and higher above, the deciduous broadleaf forest.

This is rather a new insight, and a lot of things may be learned by this novel approach about the origin of postglacial agricultural exploration in the temperate climatic zone in Eastern Asia and its interaction with the local vegetation.

We generally believe that the vegetation of vast areas of China has been largely destroyed (sometimes, to the extinction of some rare butterfly taxa — ref. 32), artificially modified, and exploited throughout its very long history, except for a few sanctuaries. It would be important to prevent further environmental deterioration and protect the integral human/nature complexes with their highly characteristic ecosystems in most parts of China, its southern half and south-western part such as Yunnan in particular. We believe that information about butterfly life in these areas would greatly contribute to our understanding of such a cardinal aspect of nature conservation and social development. This will be a multidisciplinary project including agricultural sciences, history, archaeology, cultural anthropology, ethnology, climatology, and palaeontology, as well as botany and biology in both countries, but preliminary elucidation of butterfly life histories may be prevented by their diversity and the scarcity of competent professionals. Hence there is a particular significance and importance in the intimate collaboration of professional scientists and amateurs in the two countries.

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Appendix

In China, besides the ordinary copper butterflies including *Lycaena standfussi* (Grum-Grushmailo) (Lycaenidae, s. lato : Lycaeninae, s. lato : Lycaenini, s. lato including the subtribes Lycaeniti or coppers of ordinary appearance and Heliopholiti), there occurs a group of five rather unusual-looking species

belonging to Lycaeniti endemic to the South-west of China : *Lycaena ouang* (Oberthür), *L. li* (Oberthür), *L. tseng* (Oberthür), *L. pang* (Oberthür) and *L. irmae* (Bailey). They might eventually prove to represent a good genus of their own (Group of Five), showing among them a very interesting transition from a hairstreak-type wing shape and patterning (*ouang* and *li*) to those of the ordinary copper-type (*irmae*). I found that the subtribes Lycaeniti and Heliophoriti which were distinguished by some solid morphological differences, also differed from each other largely in their external look : the thecline or hairstreak-type appearance predominated only in Heliophoriti (8). I therefore wondered whether the two species *ouang* and *li* in West China would behave like thecline species, living among or on trees and shrubs rather than in meadows and other open spaces. I also wished to ascertain foodplants of all the five species mentioned above, to find out the extent of "adaptive radiation" in this compact group of Lycaenidae, as well as to examine whether the accepted differences between Lycaeniti and Heliophoriti were also actually due to the adaptive or functional rather than structural differences. Needless to say, this point is of some importance in assessing the meaning and nature of individual characters used in the taxonomy of this group, which might possibly demand a reappraisal of the taxonomic methodology currently used for this group.

Note added in press

S. Koiwaya, in *Yadoriga* (141), 13-22 (1990), has recently pointed out that, although foreign travellers, scientists or otherwise, are not allowed to catch and take away (export) any butterflies of China without permission of the Academia Sinica, Chinese citizens may freely collect and sell them as a part of foreign trade. Butterfly materials thus obtained by foreign collectors and scientists could be used without the restrictions which would be imposed on them if they themselves collected those insects. I mistakenly interpreted that such trades by Chinese subjects were also illegal, thus stating that descriptions of the new taxa by some Japanese authors in reference 33, published without disclosing the route by which specimens of the new taxa were obtained, must have been based on poached (by whomever) materials. Apparently this need not be so. According to what Koiwaya has elucidated, probably 99% of the butterfly specimens from China now in the possession of Japanese collectors and dealers were exported to Japan quite legally, with the assistance of many, presumably trained Chinese collaborators for economic gain. The question arises, then, as to why Chinese scientists at the Institutes of Academia Sinica have not mentioned these points to Japanese scientists, not least because new taxa from China based on such legally exported materials may be named, with neither the holotypes returned to Chinese public institutions nor Chinese scientists being invited to joint-authorship.